Improvements in or relating to magnetic brakes

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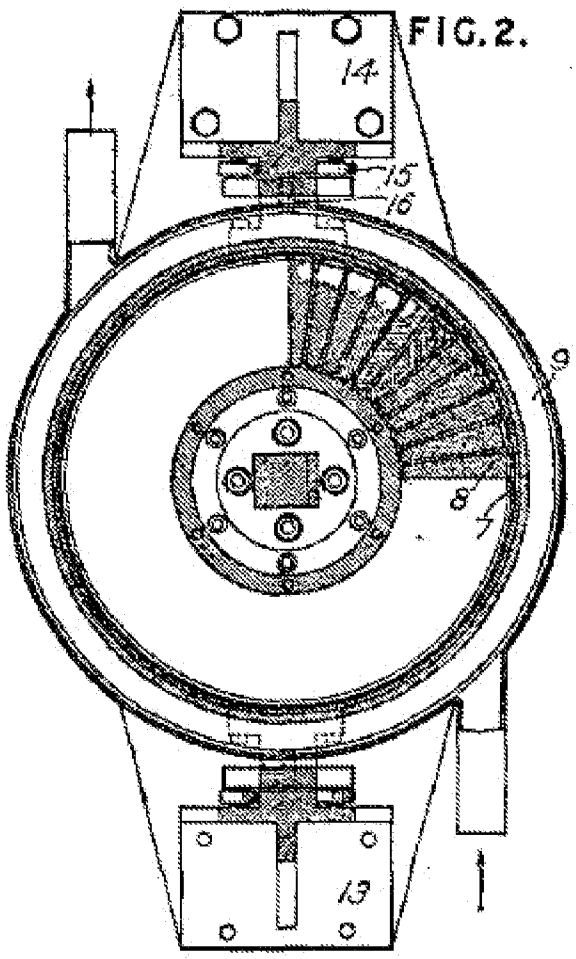
Abstract of **GB821122**

821,122. Magnetic brakes. PHILIPS ELECTRICAL INDUSTRIES Ltd. Aug. 30, 1957 [Sept. 4, 1956], No. 27385/57. Class 35. A vehicle brake comprises a liquid-cooled stator surrounding a permanent magnet rotor in the braking position but axially movable away from the rotor. The rotor magnetized as shown co-operates with a stator comprising copper and magnetic rings 7, 8 surrounded by a jacket 9 connected to the engine cooling water system. The system is movable on wheels 15, 16 on guide rails 13, 14 secured to the rear axle.



PATENT SPECIFICATION

DRAWINGS ATTACHED

821,122

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COMPLETE SPECIFICATION

Improvements in or relating to Magnetic Brakes

We, PHILIPS ELECTRICAL INDUSTRIES LIMITED, of Spencer House, South Place, Finsbury, London, E.C.2, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to permanent-magnetic brakes operating on the eddy-current principle, particularly for use on vehicles.

This kind of brake is particularly useful for motor-cars to permit long braking periods on slopes.

Magnetic brakes have already been proposed for vehicles. In one known construction, the magnetic lines of force are produced by electro-magnets. The use of this form of brake thus requires the supply of electrical power from the motor-car. The supply of electrical energy is vulnerable, so that failure of the braking system may readily occur.

According to the present invention, in a multipolar, permanent magnet brake operating on the eddy current principle, the permanent magnet structure is secured to a part adapted to rotate with the wheels of a wheeled vehicle and a cylinder, associated with means for liquid cooling, coaxial with the axis of rotation of the permanent magnet structure and in which the eddy currents are to be produced, is movable axially into and out of a braking position, the cylinder in the braking position encircling the permanent magnet structure.

The use of the multipolar permanent magnet construction renders the brake independent of electrical energy, whilst the eddy current principle yields a sufficient braking power with a small size of brake. The cylinder in which the eddy currents are produced is subjected to heating and is cooled for example by connection with an existing liquid-cooling system of the car. Since the cylinder in which the eddy currents are produced does not rotate with the wheels of the vehicle, the connection with a circulating cooling system can be carried out in a simple manner. If the brake is put out of use, that is, if the watercooled cylinder is slid off the magnet structure, the permanent magnet structure is exposed automatically to air cooling owing to the rotary movement. The position of the magnets on the outer side is conductive thereto. Effective cooling is particularly important, if the permanent magnetic material used is an oxidic ceramic material according to the formula $MO.6Fe_2O_3$, wherein M designates one or more of the elements Ba, Sr or Pb, which may be replaced to a maximum of 0.4% by Ca. The permanent magnetic properties of this material are temperature-dependent to a higher degree than those of magnet steel.

In order that the invention may be readily carried into effect, one embodiment will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is an elevation with a partial horizontal section of a permanent magnetic brake mounted in a motor-car; and

Figure 2 is a sectional view taken on the line II—II of Figure 1.

On a propeller shaft 1, between a differential casing 2 and a cross-shaped link 3 is mounted a permanent magnet structure 4 by means of bolts 5. The permanent magnet structure consists of flat permanent magnets 6, which are magnetized in a tangential direction, adjacent magnets having identical poles facing each other. Between the permanent magnets 6, provision is made of thin plates 6*a* of ferromagnetic material, so that on the outer side of the permanent magnet structure 4 a large number of strong, alternating North and South-poles is formed. The permanent magnet structure 4 is surrounded by a stator comprising a cylinder 7 of copper which is surrounded by a cylinder 8 of ferromagnetic material so that the magnetic lines of force are readily closed. The cylinder 8 is surrounded by a cooling jacket 9, which is provided with an inlet 10

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Price 4s 6d

and an outlet 11, which is connected to the cooling water circuit of the motor-car engine. To the rear axle 12 of the car are secured guide rails 13 and 14 engaged by wheels 15 of the system 7, 8, 9, which system is thereby prevented from rotating. Rotation of the system 7, 8, 9 in the plane of Figure 1 is prevented by wheels 16. In order to operate the brake, the system 7, 8, 9 is moved by a cable 17 into alignment with the permanent magnet system. To release the brake, the cable 17 is released and the system 7, 8, 9 is moved by a restoring spring, not shown, in the direction of the rear axle 12.

WHAT WE CLAIM IS:—

1. A multipolar, permanent magnet brake operating on the eddy current principle, wherein the permanent magnet structure is secured to a part adapted to rotate with the wheels of a wheeled vehicle and a cylinder, associated with means for liquid cooling, coaxial with the axis of rotation of the permanent magnet structure and in which the eddy currents are to be produced, is movable axially into and out of a braking position, the cylinder in the braking position encircling the permanent magnet structure.

2. A multipolar, permanent magnet brake as claimed in claim 1, constructed substantially as described herein with reference to the accompanying drawings.

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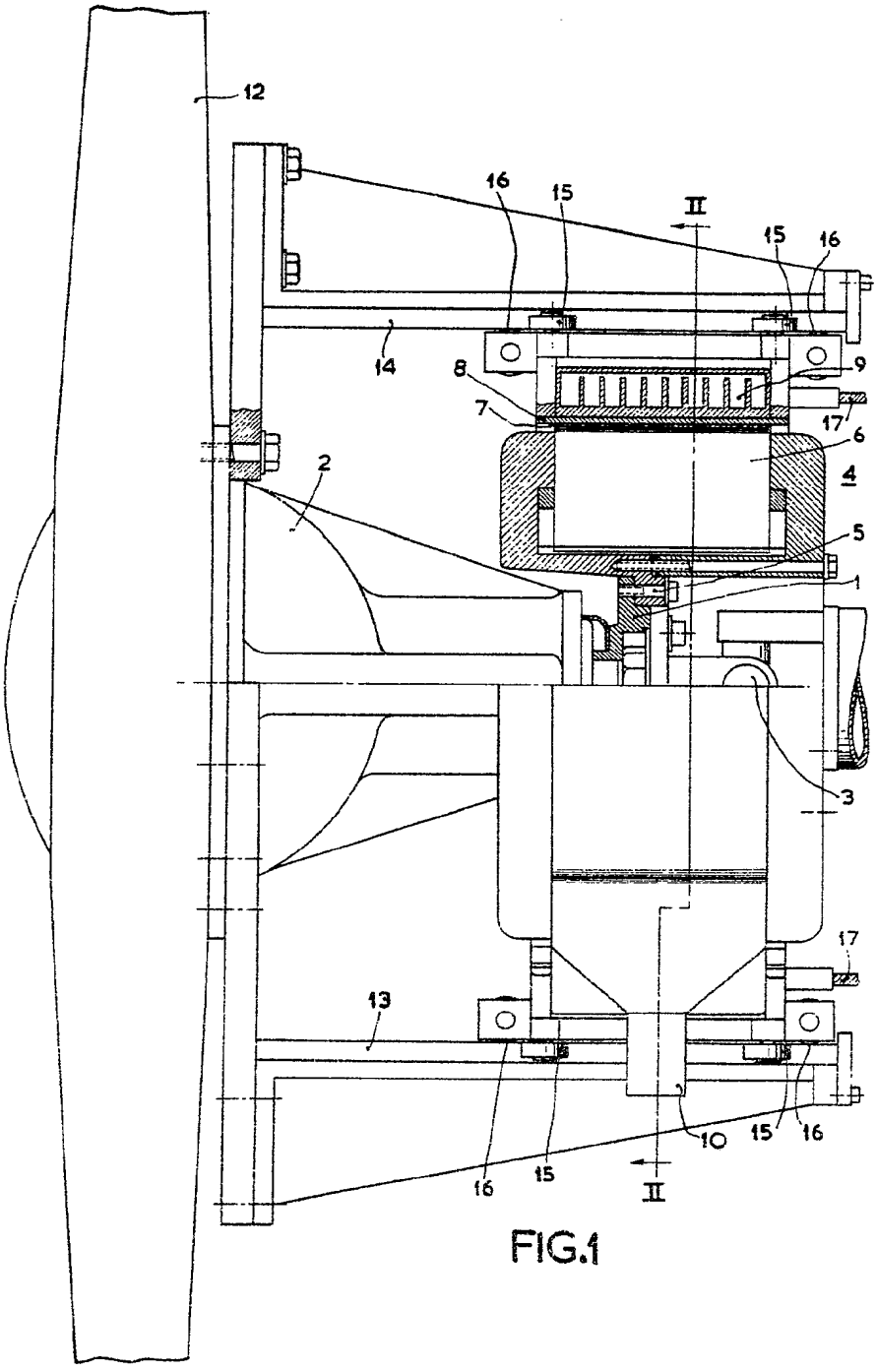

FIG.1

821,122 COMPLETE SPECIFICATION

2 SHEETS

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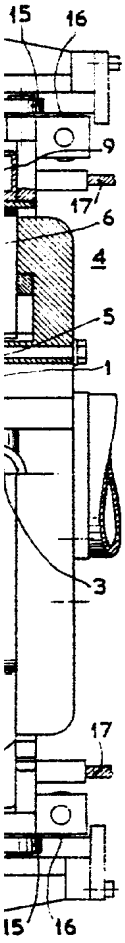
SHEETS 1 & 2



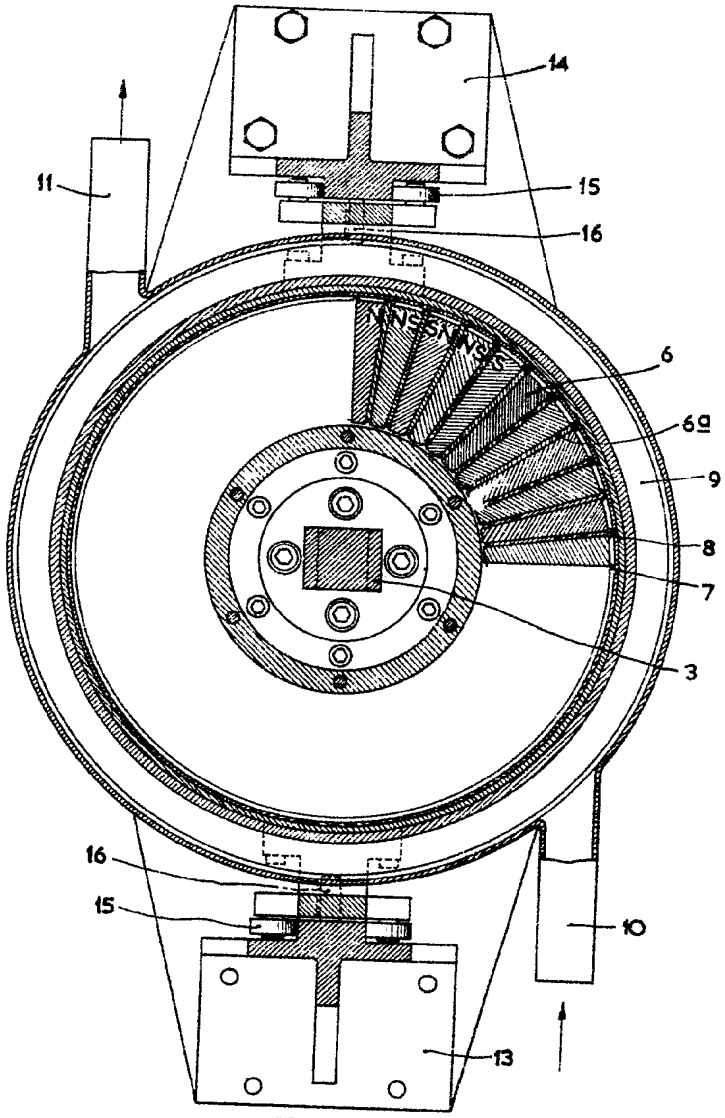


FIG.2

821,122 COMPLETE SPECIFICATION

2 SHEETS

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SHEETS 1 & 2

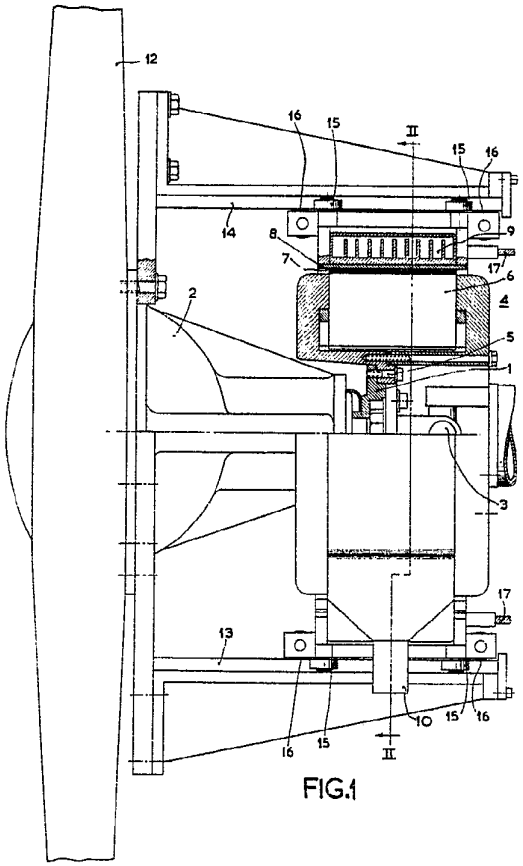

FIG.1

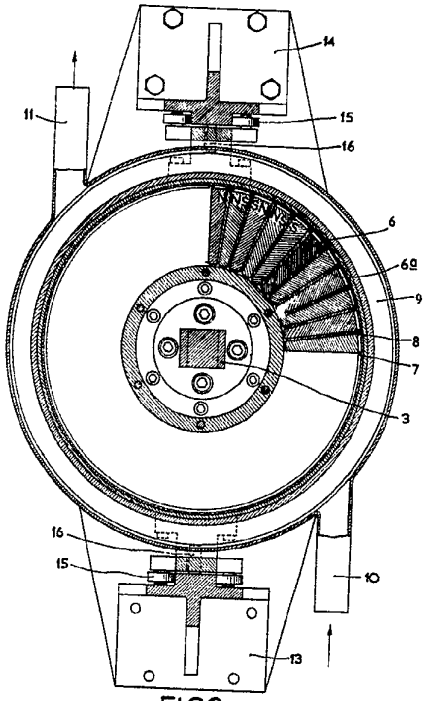

FIG.2